

CLAIMS

- sub B67
1. An optical apparatus comprising a frequency stabilised linear HeNe gas laser having an Ne content of an Ne^{20} isotope and an Ne^{22} isotope in substantially equal proportions, the apparatus in use having optical feedback toward the laser causing, at least 0.1% of the light output of the laser to be returned toward the laser.
2. An optical apparatus as claimed in claim 1 wherein the apparatus comprises one of:
an interferometric displacement determination device;
a polarisation measurement device;
spectroscopic analysis apparatus; or
a heterodyne frequency measurement device.
3. An interferometric displacement determination device comprising a frequency stabilised linear HeNe gas laser having an Ne content of an Ne^{20} isotope and an Ne^{22} isotope in substantially equal proportions, the apparatus in use having optical feedback toward the laser causing, at least at intervals, at least 0.1% of the light output of the laser to be returned toward the laser, the device being any one of a single beam, a plane mirror, a long range, or an optical fibre type.
4. An interferometric displacement determination device as claimed in claim 3 wherein the Ne^{20} and Ne^{22} isotope content is in the ratio of about 60:40 to about 40:60 respectively.
5. An interferometric displacement determination
- Sub a27

A²
conced

device as claimed in claim 3 or claim 4 wherein the HeNe gas ratio is about 80:20 to about 90:10 respectively.

- 5 6. An optical apparatus or interferometric displacement determination device as claimed in any one of the preceding claims wherein the laser achieves a frequency stabilisation below 1×10^{-7} (Frequency noise/Absolute frequency) and the optical feedback is
- 10 in the range of 0.1% to 10% of the light output of the laser.
7. An optical apparatus or interferometric displacement determination device as claimed in any one of the
- 15 preceding claims wherein the apparatus or the device includes an optical fibre element.
8. An optical apparatus or interferometric displacement determination device as claimed in claim 6
- 20 wherein the method of frequency stabilisation employed is modal control.
9. An optical apparatus or interferometric displacement determination device as claimed in claim 7
- 25 wherein the modal control is control of the ratio of the intensities of two laser modes.

40040553 043502

B6
cat

add B6